

REMARKS

Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

Claims 1, 10 and 17 are currently being amended.

This amendment adds, changes and/or deletes claims in this application. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, is presented, with an appropriate defined status identifier.

After amending the claims as set forth above, claims 1-4, 6, 8-13, 15-20, and 22-23 are now pending in this application.

Claim Rejections – 35 U.S.C. § 103

On page 2 of the Office Action, Claims 1-3, 6, 10, 15, 17-20 and 22 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,399,496 (Edelstein). Applicants respectfully traverse the rejections.

To advance prosecution, Claim 1 has been amended to recite that “the resistance of the via filled with the copper alloy via material is between 1.8 and 2.2 $\mu\Omega$ cm less than the resistance of a via filled with copper.” Edelstein does not disclose, teach or suggest filling the via with copper alloy material such that the resistance of the via is between 1.8 and 2.2 $\mu\Omega$ cm less than the resistance of a via filled with copper as recited in amended Claim 1.

Claim 1, as amended, further recites that “depositing the copper alloy via material includes using an electroplating solution including organic additives to reduce voids in the via, wherein the organic additives are at least one of polypropylene glycols, polyethylene glycols and mercaptan disulfides.” Edelstein does not disclose, teach or suggest using an electroplating solution including organic additives to reduce voids in the via. Further, Edelstein does not disclose, teach or suggest that

the organic additives are at least one of polypropylene glycols, polyethylene glycols and mercaptan disulfides.

Applicants request withdrawal of the rejection of Claim 1.

Amended Claim 10 recites, in combination with other elements, “filling the via aperture with a ternary copper alloy via material to form a ternary copper alloy via on the conformal layer, the ternary copper alloy including at least one element for lowering resistivity and at least one of Chromium (Cr) or Calcium (Ca), wherein the ternary copper alloy via material includes an element with a characteristic for increasing grain size of the ternary copper alloy via, wherein the resistance of the ternary copper alloy via is between 1.8 and 2.2 $\mu\Omega$ cm less than the resistance of a via filled with copper, wherein filling the via aperture includes using an electroplating solution including organic additives to reduce voids in the ternary copper alloy via, wherein the organic additives are at least one of polypropylene glycols, polyethylene glycols and mercaptan disulfides.” Accordingly, Claim 10 is nonobvious over Edelstein for at least the same reasons stated above with regard to Claim 1. Applicants respectfully request withdrawal of the rejection of Claim 10.

Amended Claim 17 recites, in combination with other elements, “filling the aperture with a ternary copper alloy via material to form a ternary copper alloy via on the barrier material, the ternary copper alloy via including at least one of the following pairs of elements: Tin and Calcium; Tin and Chromium; Zinc and Chromium; Zinc and Calcium; Silver and Chromium; and Silver and Calcium, wherein the ternary copper alloy via material includes an element with a characteristic for increasing grain size of the ternary copper alloy via, wherein the resistance of the ternary copper alloy via is between 1.8 and 2.2 $\mu\Omega$ cm less than the resistance of a via filled with copper, wherein filling the aperture includes using an electroplating solution including organic additives to reduce voids in the ternary copper alloy via, wherein the organic additives are at least one of polypropylene glycols, polyethylene glycols and mercaptan disulfides.” Accordingly, Claim 17 is nonobvious over Edelstein for at least the same reasons stated above with regard to Claim 1. Applicants respectfully request withdrawal of the rejection of Claim 17.

Claims 2-3, 6, 15, 18-20 and 22 depend variously from independent Claims 1, 10 and 17 and are allowable over Edelstein for at least the same reasons as Claims 1, 10 and 17. Applicants request withdrawal of the rejection of Claims 2-3, 6, 15, 18-20 and 22 as well.

On page 4 of the Office Action, Claims 8, 13 and 16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Edelstein in view of U.S. Patent No. 6,749,699 (Bogel). Dependent Claim 8 depends from Claim 1 and is allowable for at least the same reasons as Claim 1. Dependent Claims 13 and 16 depend from Claim 10 and are allowable for at least the same reasons as Claim 10. The citation to Bogel does not remedy the deficiencies of Edelstein. Thus, Claims 8, 13 and 16 are also patentable.

On page 5 of the Office Action, Claim 4 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Edelstein and Bogel in view of U.S. Patent No. 6,440,849 (Merchant). Dependent Claim 4 depends from Claim 1 and is allowable for at least the same reasons as Claim 1. The citation to Bogel and Merchant does not remedy the deficiencies of Edelstein. Thus, Claim 4 is also patentable.

On page 5 of the Office Action, Claims 9 and 23 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Edelstein and Bogel in view of U.S. Patent No. 6,380,083 (Gross). Dependent Claim 9 depends from Claim 1 and is allowable for at least the same reasons as Claim 1. Dependent Claim 23 depends from Claim 17 and is allowable for at least the same reasons as Claim 17. The citation to Bogel and Gross does not remedy the deficiencies of Edelstein. (Gross, column 4, lines 39-47.) Thus, Claims 9 and 23 are also patentable.

On page 6 of the Office Action, Claims 11-12 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Edelstein and Bogel in view of U.S. Patent No. 6,090,710 (Andricacos). Dependent Claims 11-12 depend from Claim 10 and are allowable for at least the same reasons as Claim 10. The citation to Bogel and Andricacos does not remedy the deficiencies of Edelstein. Thus, Claims 11-12 are also patentable.

Conclusion

Applicants believe that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by the credit card payment instructions in EFS-Web being incorrect or absent, resulting in a rejected or incorrect credit card transaction, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicants hereby petition for such extension under 37 C.F.R. §1.136 and authorize payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

Date September 14, 2009

By /Joseph N. Ziebert/

FOLEY & LARDNER LLP
Customer Number: 34083
Telephone: (414) 297-5768
Facsimile: (414) 297-4900

Joseph N. Ziebert
Attorney for Applicant
Registration No. 35,421